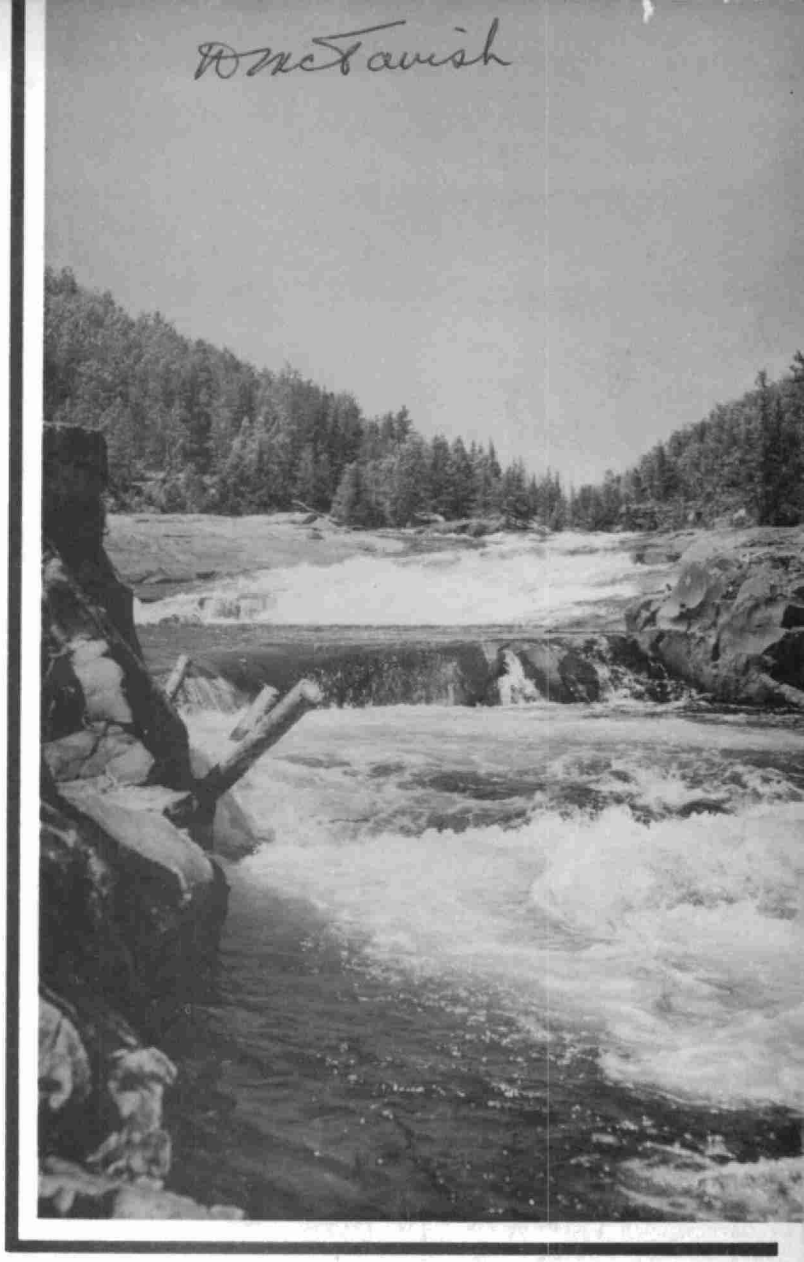
Kitchener Sewage Treatment Plant



1963 Annual Report

Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
City of Kitchener.

Gentlemen:

I am pleased to submit, for your information, the 1963 Annual Operating Report of the Kitchener Sewage Treatment Plant, OWRC Project 58-S-19, which has been prepared by our Division of Plant Operations.

We are grateful for the kind cooperation which you and your staff have extended to our Operations staff throughout the year. We look forward to a continuing close association with you in our mutual endeavour to control pollution.

Yours very truly,

D. S. Caverly,
General Manager

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Kitchener Sewage Treatment Plant, OWRC Project 58-S-19.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B. C. Palmer,
Director,
Division of Plant Operations

foreword

This report is designed to present the highlights of the operation of these works during 1963. Trends in flows and other operating data can be extremely useful in the development of necessary long range enlargement and improvement programs.

In addition to the activities reported herein, much unrecorded effort has contributed to the success of this operation. The municipality, through representatives on the Local Advisory Committee, have given valuable assistance in reviewing salary schedules, detailed operating budgets, personnel problems, flow patterns, and major maintenance problems.

The Division of Plant Operations has provided direction to the field staff in administrative procedures, quality control, maintenance schedules, equipment inspection and purchase supervision. A number of other Divisions of the Commission have been of service. The Division of Construction has offered helpful advice on equipment selection and renovation problems. The Division of Sanitary Engineering has maintained, through its District Engineering staff, a keen interest in the operation and has made a number of constructive recommendations. Its operator training courses have been very helpful. The Division of Finance has processed many payrolls, purchase orders and invoices dealing directly with this project. The Commission Personnel Director has been most helpful in the counselling of personnel problems.

The excellent cooperation of all of these groups is gratefully acknowledged.

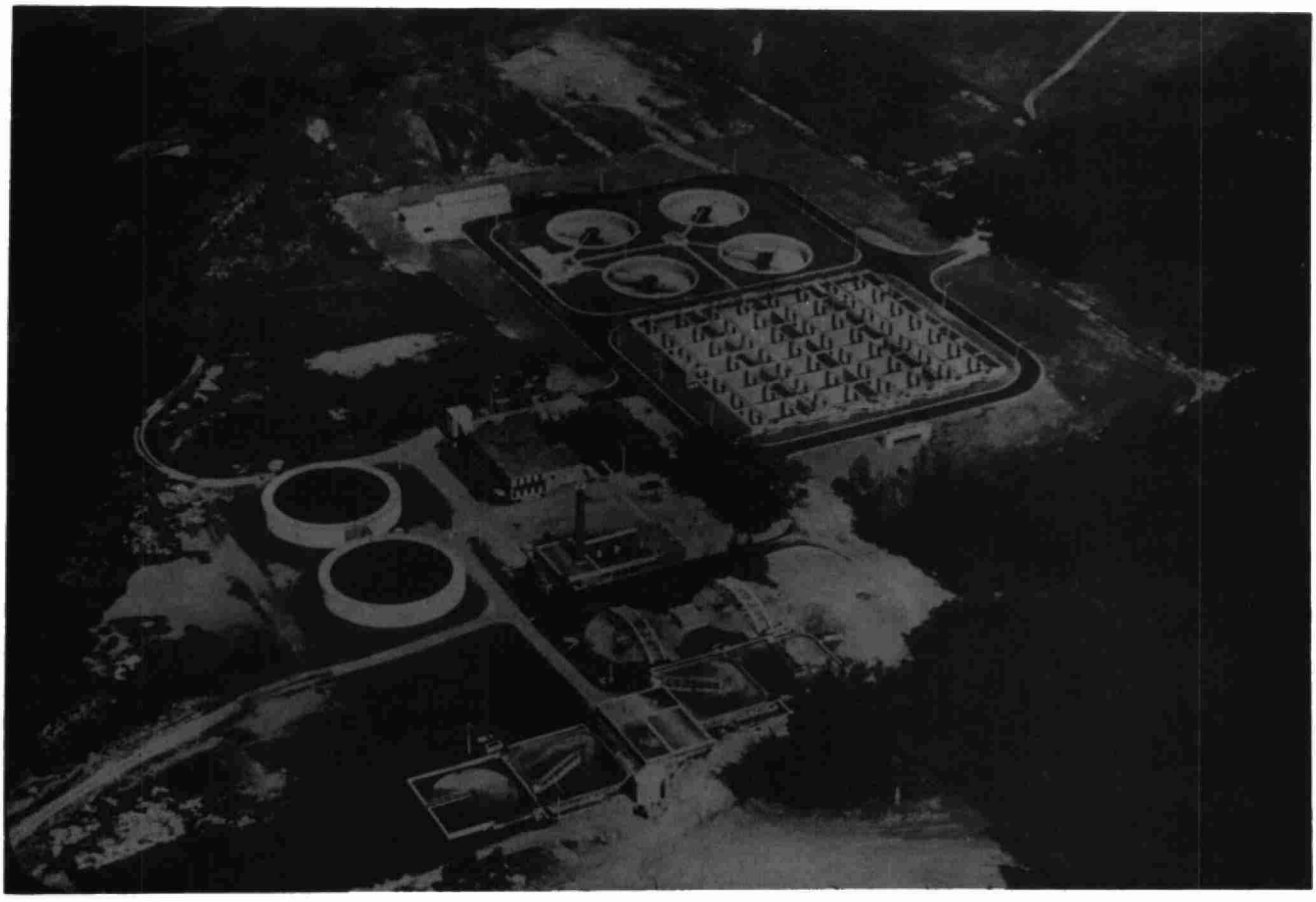
B. C. Palmer,
Director,
Division of Plant Operations

DIVISION OF PLANT OPERATIONS

contents

C. W. Perry
Assistant Director
D. McTavish
Regional Supervisor
B. G. Porter
Operations Engineer

KITCHENER SEWAGE TREATMENT PLANT



OPERATED FOR

THE CITY OF KITCHENER

BY

THE ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN

A. M. Snider

COMMISSIONERS

W. D. Conklin, Q. C.
J. H. H. Root, M. P. P.
J. A. Vance, LL. D., P. Eng.
A. A. Wishart, Q. C., M. P. P.

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

G. M. Galimbert
L. E. Owers

COMMISSION SECRETARY

W. S. MacDonnell

1956 to 1963 History

INCEPTION

In 1956, the City of Kitchener and the Ontario Water Resources Commission initiated plans to enlarge the existing Doon Valley Sewage Treatment Plant and replace the existing Spring Valley plant with a pumping station to discharge sewage from that area to the Doon plant. The enlargement of the Doon plant and the addition of secondary sections to provide full biological treatment was undertaken in two stages.

The firm of Proctor & Redfern, Toronto, Ontario, Consulting Engineers, was engaged to prepare plans and specifications for the project.

APPROVAL

The initial agreement between the City and the Commission to finance, construct and operate the plant was signed late in 1956.

CONSTRUCTION

Construction of the Doon plant extensions, Spring Valley pumping station and force main and relief sewer was carried out by Schwenger Construction Co. Ltd., Harry Wunder Construction Ltd. and Ture Anderson Construction Ltd., respectively. The primary enlargement was completed in 1960.

Secondary treatment facilities were completed in 1963 by Dunker Construction Co. Ltd., Kitchener.

TOTAL COST

Doon Primary plant enlargements	$ 1,308,000
Secondary treatment facilities	1,515,000

Project Staff

A. W. Becker

Superintendent

Assistant Superintendent - L. R. Edwards

Lead Operators

J. H. Bowie
F. Dobson
P. W. Kuehl
G. L. Lebegut
A. H. Schlueter

Laboratory Technician

K. Sakamoto

Groundskeepers

D. M. MacGregor
D. J. Oland

Maintenance Staff

Foreman - W. W. Reinhart
Electrician - L. B. Brown
Mechanic - Z. V. Etmanski

Operators

J. J. Halley
A. Nielson
J. P. O'Reilly
W. G. Pohl
E. R. Wheeler

COMMENTS

The normal complement of staff consists of 18 men. The plant is staffed continuously, each man working a 40 hour per week shift.

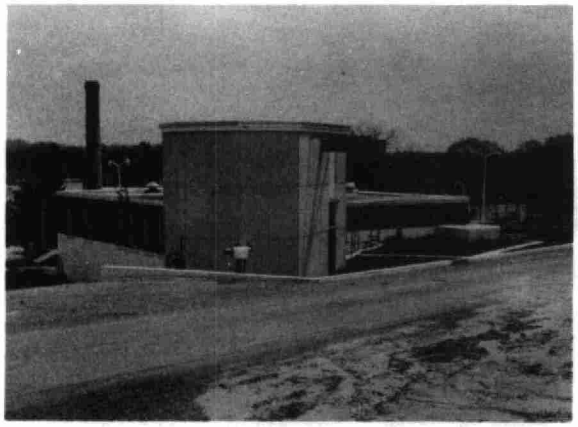
When the secondary section of the plant was completed, the plant organization was rearranged, as shown above, to handle the increased workload. Mr. Edwards and Mr. Reinhart were promoted to the positions of Assistant Superintendent and Maintenance Foreman respectively.

Part of the staff reorganization resulted in the new position of lead operator being created. The successful applicants for this position are shown above.

Two new men joined the plant staff during 1963 to fill the vacancies created by the reorganization. Mr. L. B. Brown, Plant Electrician, and Mr. D. J. Oland, Groundskeeper, both came on staff in September.

Messrs. Edwards and Reinhart received their certificates of qualification as sewage works operators in 1963 after successfully completing a series of three, one week duration courses of instruction sponsored by the OWRC. Mr. Becker has successfully completed the Intermediate course. Mr. Sakamoto is currently enrolled in the course and successfully completed the first series of lectures in 1963.

Description of Project

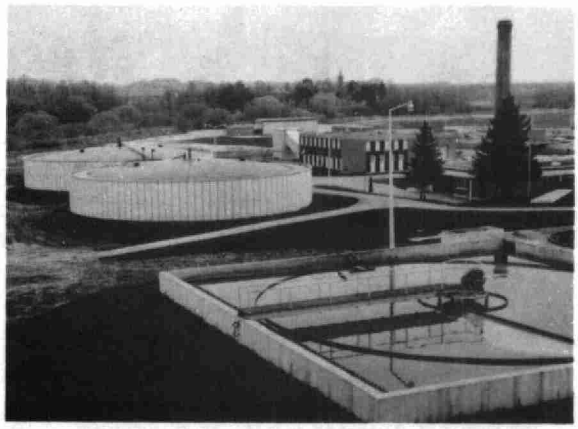


INFLUENT WORKS

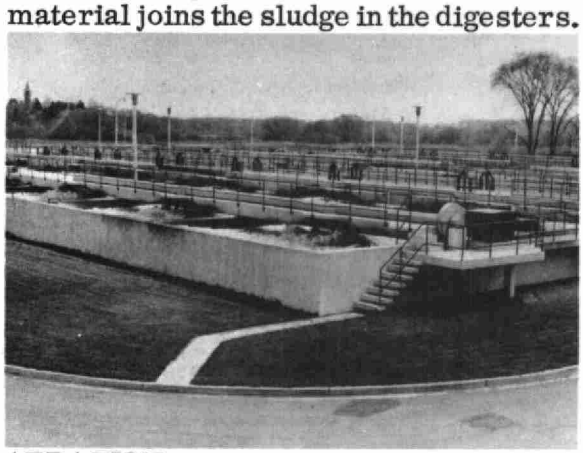
The sewage reaches the plant through a 48 inch diameter trunk main and passes through a coarse bar screen which removes large (over two inches) solids. The flow then passes through two rotogrators and one comminutor which are mechanically cleaned medium bar screens equipped with a shredding drum to cut the screenings and allow them to join the main flow. The sewage then passes through a 3 foot Parshall flume where the flow is measured, indicated and recorded. The flow is then divided between two aerated grit chambers. Sand and grit is removed and air lifted to a hopper to be disposed by burial. The air degrittors have a total volume of 23,000 gallons and provide a retention time of three minutes at design flow. Two mesh rotary screens receive sewage from the grit removal units. These screens are designed to remove hair and other matted material.

PRIMARY CLARIFIERS

A grease separator is located on each side of the grit building and sewage passes through these units where large quantities of bubbled air cause the grease to rise in the form of grease balls. The grease balls are removed manually prior to primary clarification.



Four concrete tanks, 60 ft. x 60 ft. x 11.75 ft. SWD provide primary clarification. Each clarifier is provided with circular extensible sludge collector mechanisms which move the settled sludge to hoppers at the bottom of the clarifiers from where it is withdrawn and discharged to the primary digestion tanks. Circular extensible scum removal mechanisms skim floating material from the top of each clarifier. This material joins the sludge in the digesters.



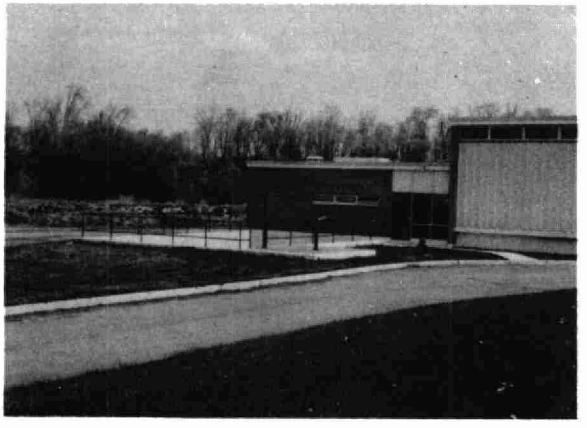
AERATION

Primary clarifier effluent flows through a 48 inch Parshall flume and overflow chamber to four baffled aeration tanks each equipped with fourteen Ames Crosta "Simplex" high intensity mechanical aeration devices. The tanks, continually seeded with activated sludge settled in the final tanks, provide the environment

where, through biological action, the finely divided, suspended and colloidal materials are oxidized.

FINAL CLARIFIERS

Four 80 ft. diameter circular concrete final tanks with 10 ft. liquid depth received the aeration effluent and allow settling of the activated sludge. The clarifiers are the rapid sludge removal type wherein the return sludge is removed hydraulically to a centre launder via plastic uptake pipes mounted on the scraper arms. The waste sludge is scraped to a central sump in the conventional manner from where it is pumped to the incoming raw sewage flow prior to primary clarification. The settled effluent is discharged over weirs to the chlorine contact chamber and subsequently to the Grand River.



SLUDGE DIGESTION TANKS

Two underground primary digesters 65 ft. in diameter x 22 ft. SWD and having a total volume of 900,000 gallons received combined raw and waste activated sludge from the primary clarifiers. These tanks have fixed concrete roofs supported by a structural steel bridge. Sludge to the digesters is measured by a magnetic flow meter. Each digester is equipped with a draft tube mixer and is heated with Rayscott hot water boilers and spiral heat exchangers. The temperature in the digesters is controlled by the amount of sludge recirculation through the heat exchangers. The initial stages of anaerobic digestion occurs in these primary digesters.

Two secondary digesters 100 ft. in diameter and having a 29 ft. mean liquid level, were constructed in 1959. The total secondary digestion volume is 2 1/2 million gallons. Floating covers and gas collection equipment are provided with these tanks. The final stages of anaerobic digestion and settling of the digested sludge occurs in these unheated tanks.

VACUUM FILTER

Digested sludge from the secondary digester is pumped onto a 500 sq. ft. vacuum filter. Lime and ferric chloride are added to the sludge to affect coagulation.

The filter drum is placed under a vacuum and moisture is withdrawn from the sludge. Appurtenances included with the filter are vacuum pumps, filtrate return pumps, lime and ferric chloride pumps, a mixing tank and sludge pumps. Filtrate flows by gravity to a filter sump. From there it is pumped to the influent works just above the air degrittor.

Design–Data

GENERAL

Type of Plant - Activated sludge.

Design Population - 100,000 persons.

Design Plant Flow - 11.0 MGD (prim.)
13.5 MGD (sec.)

Five Day BOD -

Raw Sewage	-	300 PPM
Removal	-	95%

Suspended Solids -

Raw Sewage	-	450 PPM
Removal	-	95%

PRIMARY TREATMENT

Screening and Comminution

Coarse bar screens.

Two Infilco rotogrators.

One Worthington comminutor.

Grit Removal

Type - Two air degrittors.

Size - 16 ft. x 10 ft. x 12 ft. SWD.

Volume - 23,000 gallons.

Fine Screening

Type - Two Dorr-Oliver-Long rotary screens.

Primary Sedimentation

Type - Four square concrete tanks.

Size - 60 ft. x 60 ft. x 11.75 SWD.

Retention time - 2.2 hours.

Sludge Removal - Mechanical.

SECONDARY TREATMENT

Aeration

Ames Crosta mechanical aerators - 56.

Size - Four tanks, 30 ft. x 30 ft. x 13 ft. 3 in. with "around the end" baffles, each tank being two cells in width and seven cells in length.

Retention - 7 hours at 13.5 MGD.

Final Sedimentation Tanks

Type - Circular concrete (four).

Size - 80 ft. diameter and 10 ft. SWD.

Retention - 2.4 hours at 13.5 MGD.

Chlorine Contact Chamber

Retention - 15 minutes at 13.5 MGD.

Equipment - Two B.I.F. gas chlorinators and one evaporator.

Digestion System

Two Primary Digesters Underground -

Size - 65 ft. diameter x 22 ft. SWD.

Volume - 900,000 gallons.

Fixed covers, mechanical mixing.

Two Secondary Digesters -

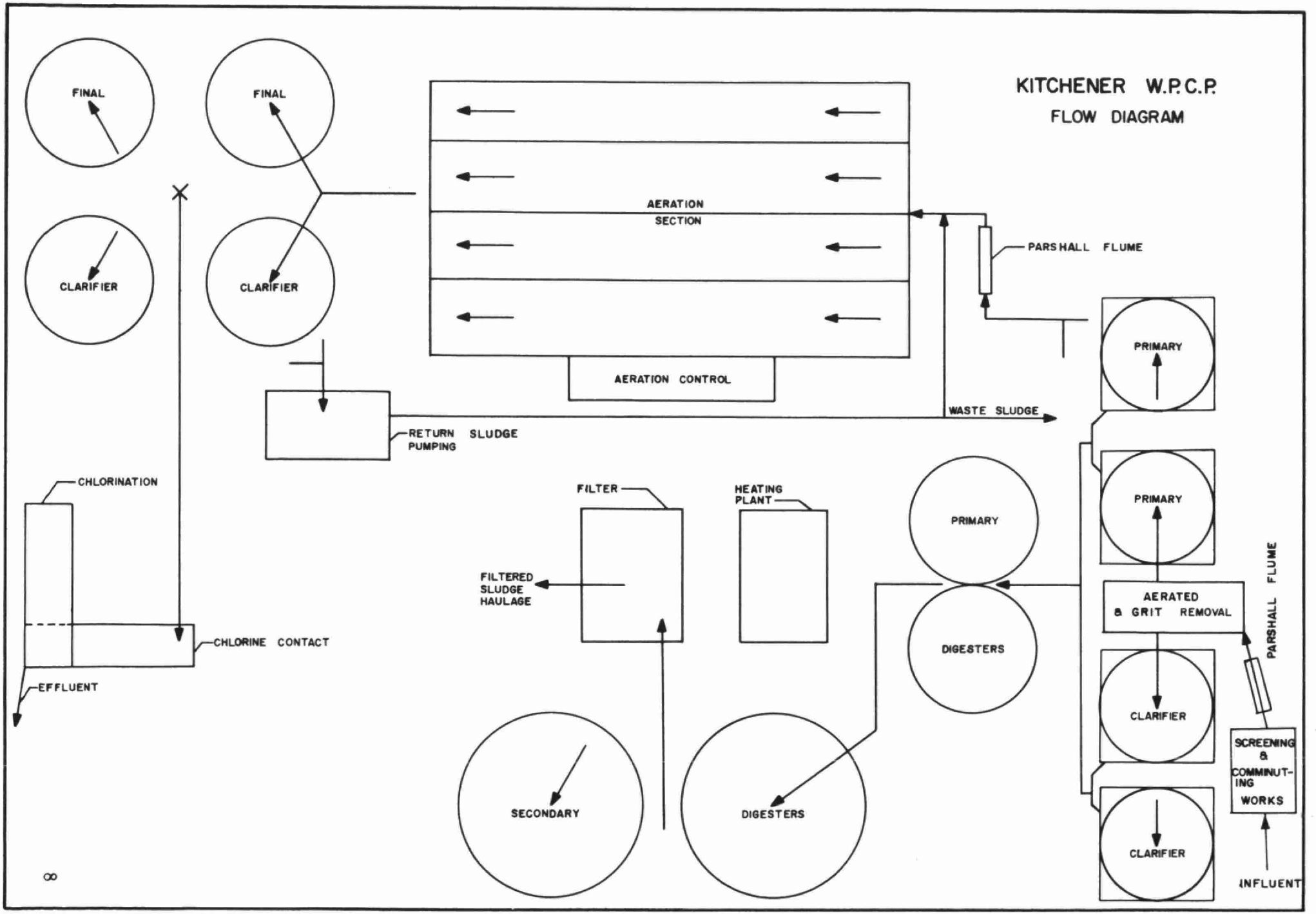
Size - 100 ft. diameter x 29 ft. SWD.

Volume - 2.5 million gallons.

Floating covers for gas storage.

Vacuum Filter

One Komline-Sanderson coil filter with 500 sq. ft. surface area.

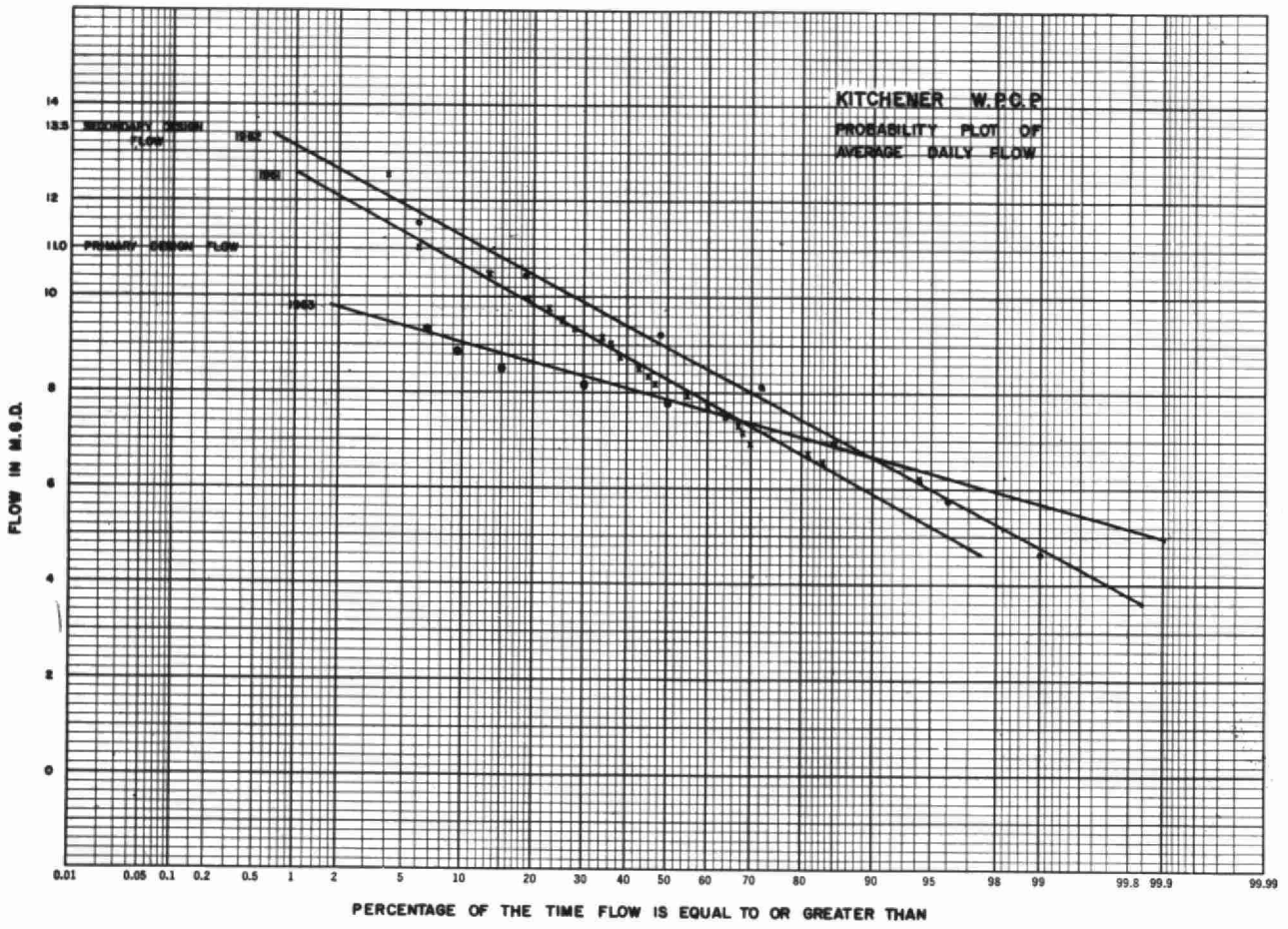

KITCHENER W.P.C.P.
FLOW DIAGRAM
FINAL
FINAL
CLARIFIER
CLARIFIER
AERATION
SECTION
AERATION CONTROL
PARSHALL FLUME
PRIMARY
PRIMARY
PRIMARY
WASTE SLUDGE
RETURN SLUDGE
PUMPING
CHLORINATION
CHLORINE CONTACT
EFFLUENT
FILTER
HEATING
PLANT
FILTERED
SLUDGE
HAULAGE
DIGESTERS
AERATED
& GRIT REMOVAL
PARSHALL FLUME
CLARIFIER
SCREENING
&
COMMINUT-
ING
WORKS
SECONDARY
DIGESTERS
CLARIFIER
INFLUENT

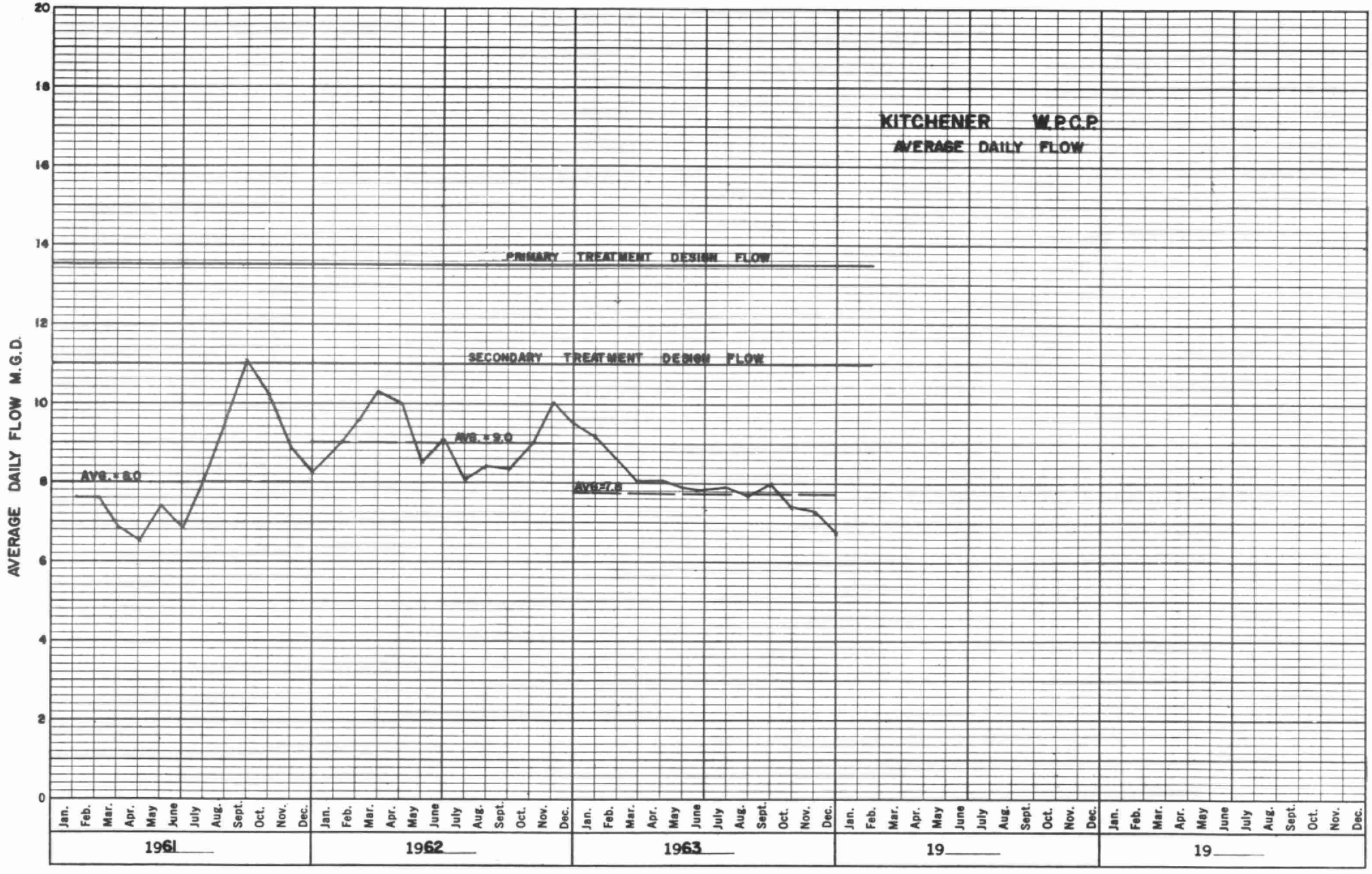
Process Data

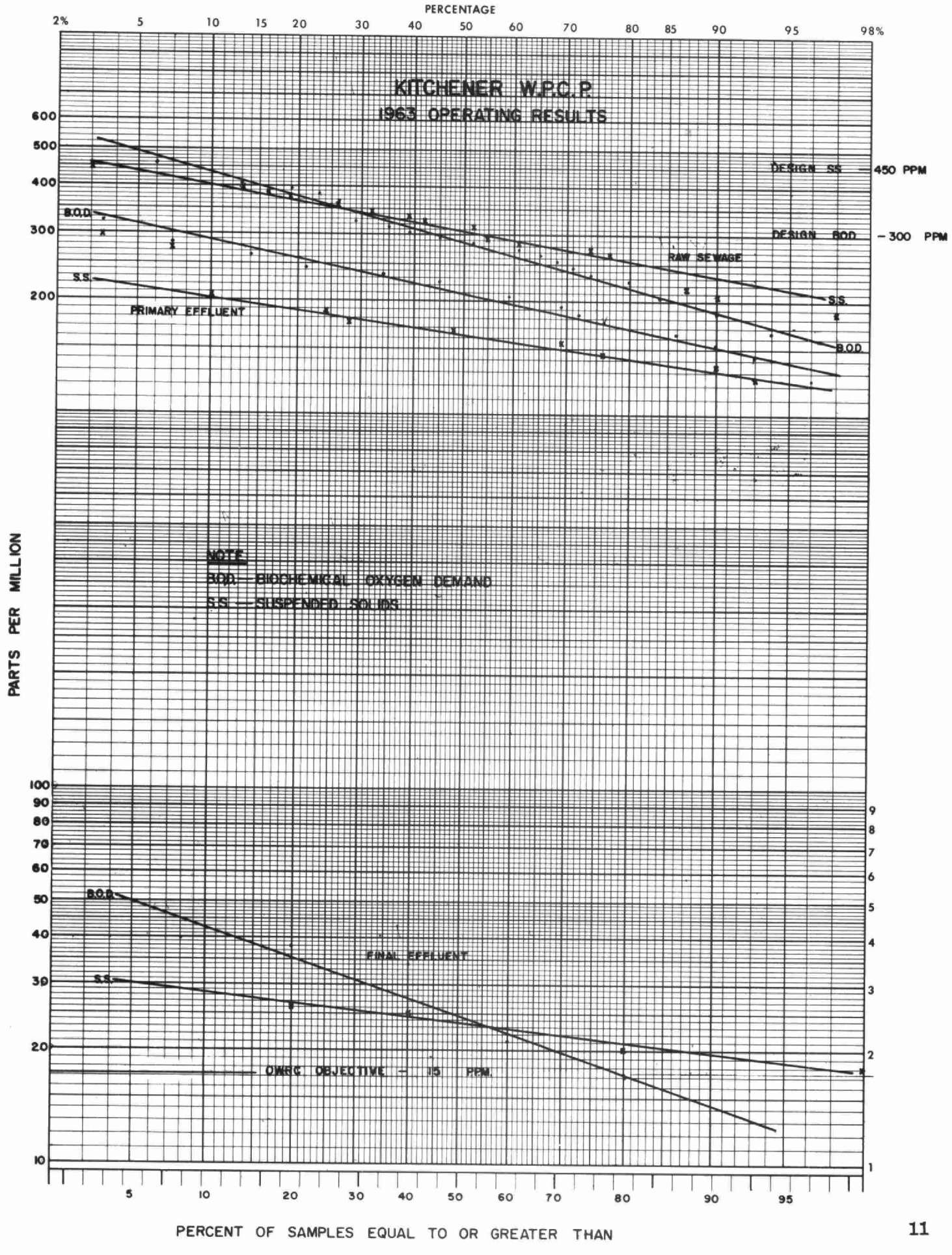
As will be noted from the following charts and graphs, the average daily flow and total flow for the year were less than the 1962 flows. During 1963, the average daily flow was 7.8 million gallons compared to 8.95 million gallons per day in 1962. This is a decrease of 13.3%. During the past year, 2.84 billion gallons of raw sewage, a combination of both industrial and domestic wastes, received primary treatment. Of this approximately 1.0 billion gallons also received secondary treatment.

The maximum 24 hour flow in the past year was 11.13 million gallons and occurred in the month of January as did the maximum average daily flow for one month of 9.02 million gallons.

The maximum short duration peak flow rate was 20.0 MGD and the minimum flow rate was 1.2 million gallons per day.




KITCHENER W.P.C.P.
AVERAGE DAILY FLOW
AVERAGE DAILY FLOW M.G.D.
PRIMARY TREATMENT DESIGN FLOW
SECONDARY TREATMENT DESIGN FLOW
AVG. = 8.0
AVG. = 9.0
AVG. = 7.8
20
18
16
14
12
10
8
6
4
2
0
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963
19____
19____


KITCHENER W.P.C.P.
1963 OPERATING RESULTS
PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
PARTS PER MILLION
600 500 400 300 200
DESIGN SS — 450 PPM
DESIGN BOD — 300 PPM
B.O.D.
S.S.
RAW SEWAGE
PRIMARY EFFLUENT
NOTE:
B.O.D. — BIOCHEMICAL OXYGEN DEMAND
S.S. — SUSPENDED SOLIDS
100 90 80 70 60 50 40 30 20 10
9 8 7 6 5 4 3 2 1
FINAL EFFLUENT
OWRC OBJECTIVE — 15 PPM
5 10 20 30 40 50 60 70 80 90 95
PERCENT OF SAMPLES EQUAL TO OR GREATER THAN

GRIT, B.O.D AND S.S. REMOVAL

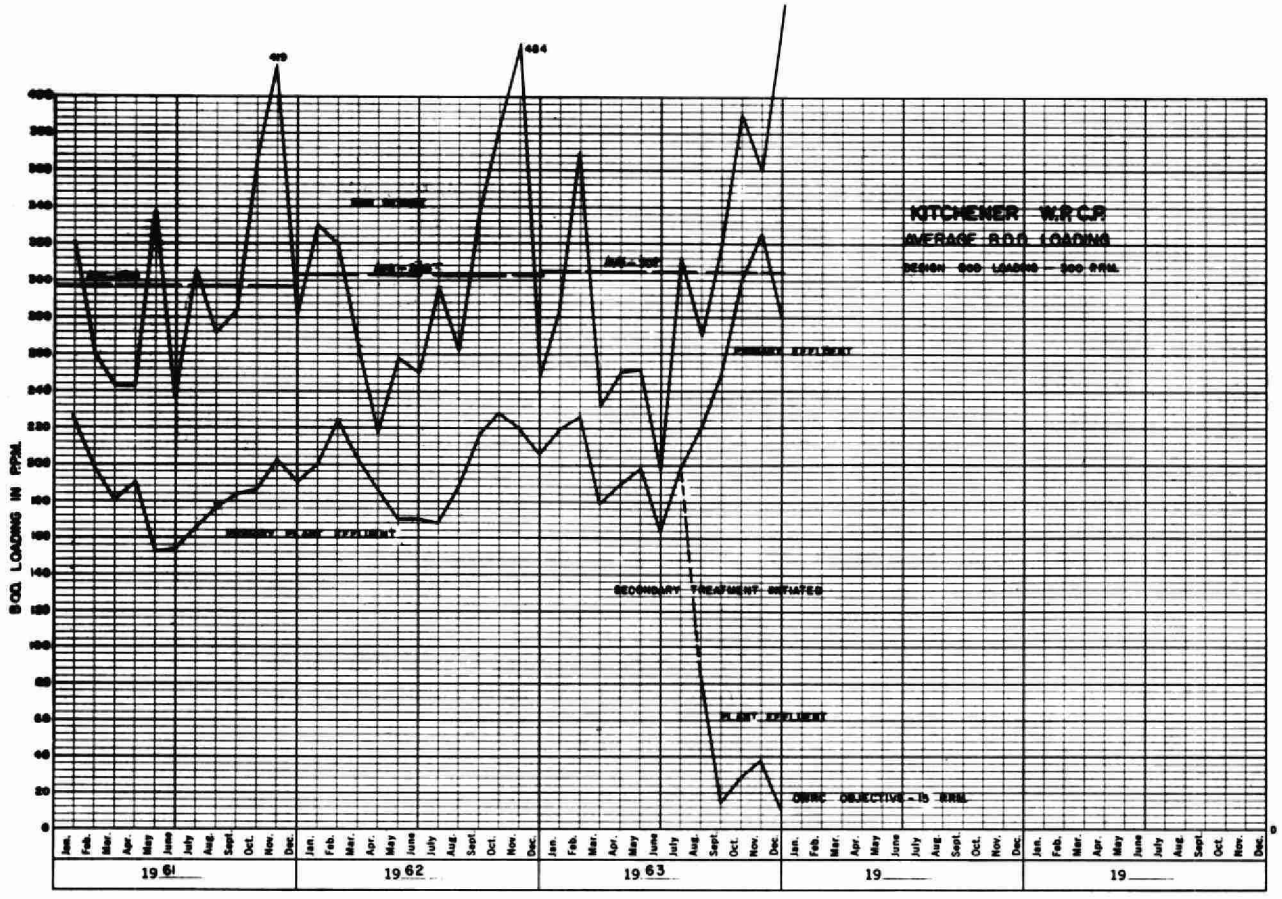
MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	284	219	23.0	91.0	305	156	49.0	208.6	289
FEB.	369	226	38.5	170.5	307	179	41.5	152.7	121
MAR.	232	179	23.0	64.7	281	162	42.5	145.2	338
APR.	249	171	31.5	92.8	214	141	34.0	86.9	249
MAY	252	198	21.5	65.1	394	142	57.5	231.3	250
JUNE	197	164	16.5	38.2	300	149	50.5	175.1	-
JULY	312	197	36.5	137.3	287	120	58.0	201.2	500
AUG.*	270	84	69.0	218.8	270	79	70.5	224.7	316
SEPT.	320	14	95.5	360.2	345	13	96.0	391.0	196
OCT.	390	28	93.0	412.0	420	26	94.0	448.0	510
NOV.	360	38	89.5	348.1	372	21	94.5	379.9	376
DEC.	450	10	98.0	468.0	394	20	95.0	306.0	280
TOTAL				2467				2951	3425
AVG.	307	127	53	205	324	100	65	245	285

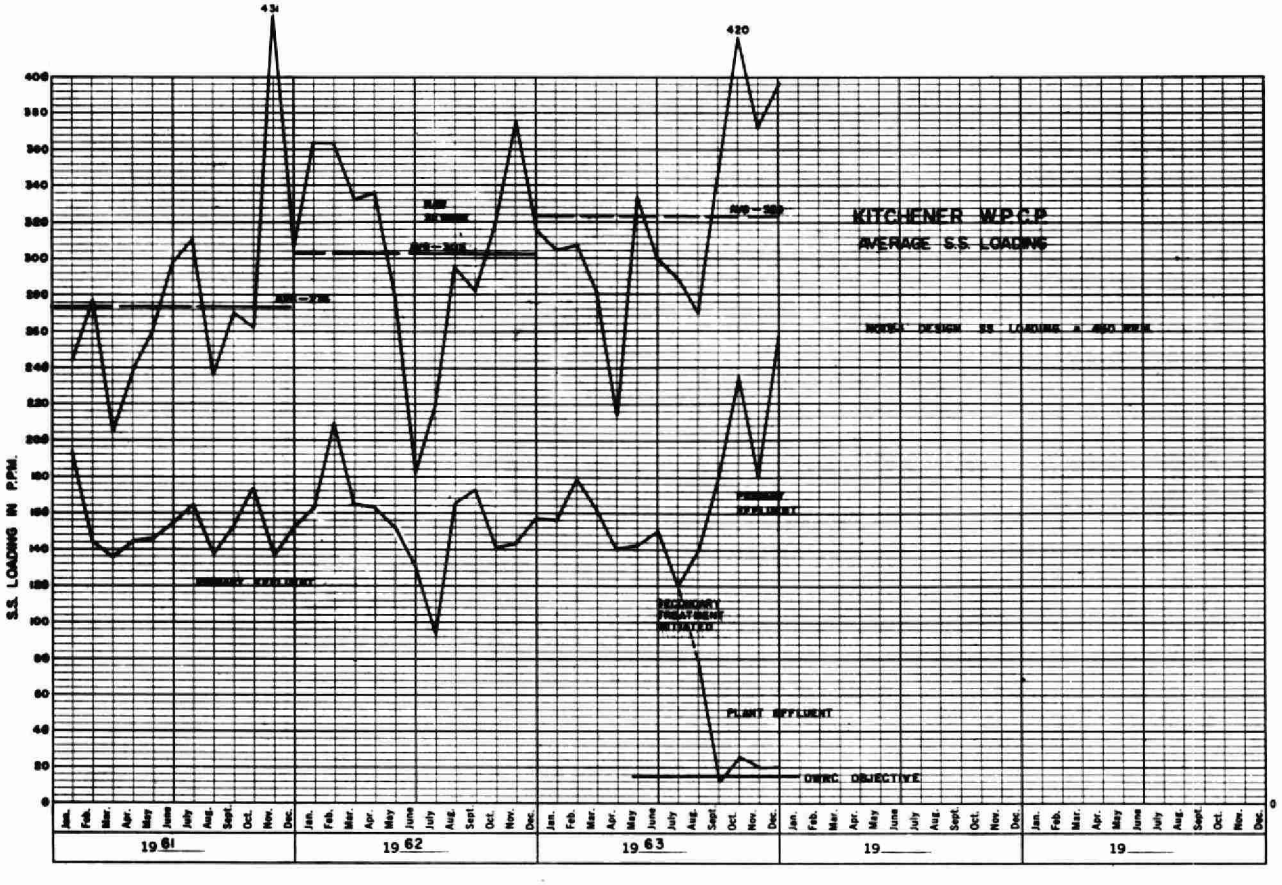
* SECONDARY TREATMENT FACILITIES PLACED IN OPERATION

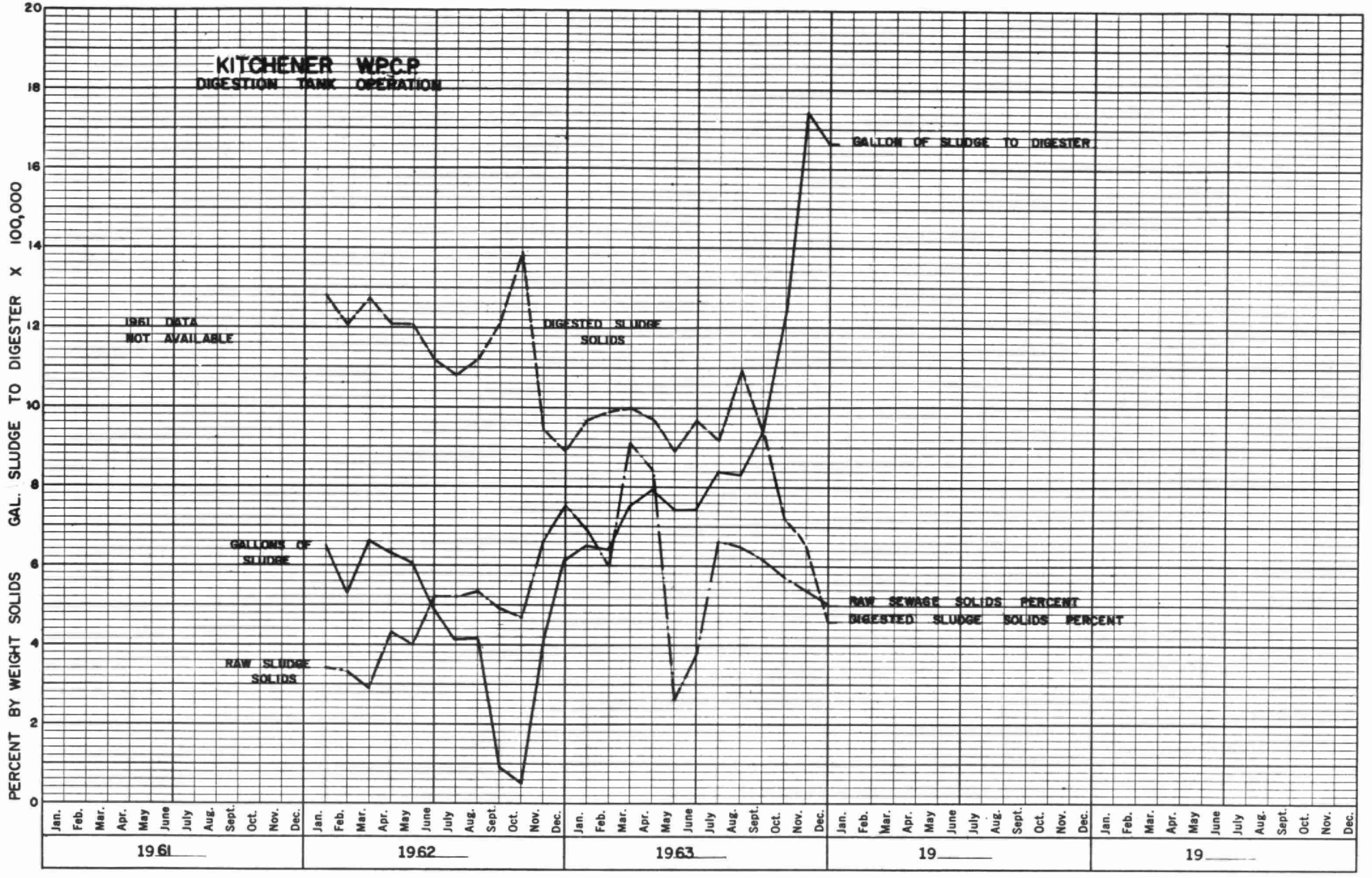
COMMENTS

The average BOD loading is slightly above the design figure of 300 PPM but the suspended solids loading is well under the design loading of 450 PPM.

The increase in BOD and solids reduction is quite evident in the chart after the startup of the activated sludge secondary treatment. The effluent quality has been approaching quite closely to the Commission standard of 15 PPM BOD and S. S. since September of 1963. This great improvement in treatment efficiency is even more obvious when the tabulated data is transposed onto the following graphs.


KITCHENER W.P.C.P.
AVERAGE B.O.D. LOADING
BOD. LOADING IN P.P.M.
PRIMARY EFFLUENT
SECONDARY TREATMENT INITIATED
PLANT EFFLUENT
OWRC OBJECTIVE - lb BOD
1961
1962
1963


KITCHENER W.P.C.P.
AVERAGE S.S. LOADING
S.S. LOADING IN P.P.M.
PRIMARY EFFLUENT
SECONDARY TREATMENT INITIATED
PLANT EFFLUENT
OWRC OBJECTIVE
1961
1962
1963


KITCHENER W.P.C.P
DIGESTION TANK OPERATION
PERCENT BY WEIGHT SOLIDS GAL. SLUDGE TO DIGESTER X 100,000
20
18
16
14
12
10
8
6
4
2
0
1961 DATA NOT AVAILABLE
DIGESTED SLUDGE SOLIDS
GALLONS OF SLUDGE
RAW SLUDGE SOLIDS
GALLON OF SLUDGE TO DIGESTER
RAW SEWAGE SOLIDS PERCENT
DIGESTED SLUDGE SOLIDS PERCENT
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963
19
19

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			% SOLIDS IN DIGESTED SLUDGE	GAS PRODUCED 1000'S CU. FT.	SLUDGE FROM DIGESTER 1000'S GALS
	1000'S GALLONS	% SOLIDS	% VOL. MAT. *			
JAN.	649	6.9	N.A.	9.65	N.A.	218.0
FEB.	643	6.0	"	9.90	"	356.0
MAR.	752	9.1	"	9.97	"	230.0
APR.	798	8.4	"	9.65	"	302.0
MAY.	742	2.6	"	8.94	"	340.0
JUNE	736	3.7	"	9.70	"	328.0
JULY	827	6.6	"	9.20	"	273.0
AUG.	824	6.5	"	10.90	"	346.0
SEPT.	931	6.2	"	9.40	"	120.0
OCT.	1240	5.7	"	7.20	"	30.0
NOV.	1742	5.4	"	6.45	"	115.0
DEC.	1630	5.0	"	4.67	"	25.6
TOTAL	11514	72.0		105.63		2684.0
AVG.	960	6.0		8.80		224.0

* VOL. MAT. - VOLATILE MATTER

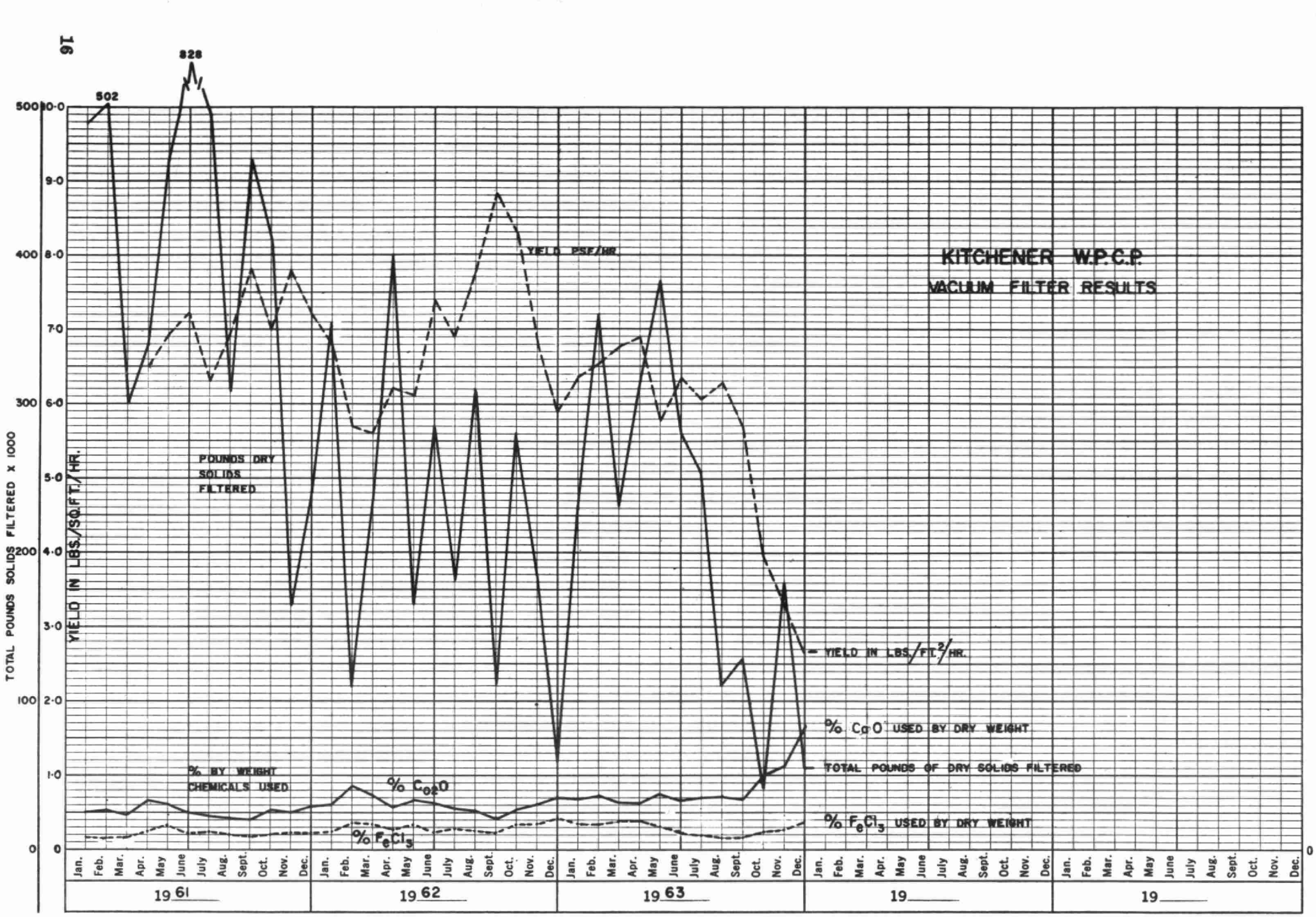
COMMENTS

Sludge production averaged 31,500 gallons per day for 1963. An increase to about 55,000 gallons per day has occurred due to the greater solids removal effected by secondary treatment. Primary treatment only, produced an average of 25,500 gallons of sludge per day over the first nine months of the year.

The difference in quantity between the sludge to the digesters and the sludge from the digester represents the quantity of supernatant liquid returned to the process or lagooned on the plant property.

Gas measuring facilities were not serviceable to indicate the rate of digestion. The waste gas burner, however, burned continuously indicating good gas production.

The increase in solids content of the digested sludge indicates good settling and contributed to the economy of sludge filtering.


KITCHENER W.P.C.P.
VACUUM FILTER RESULTS
YIELD IN LBS./SQ.FT./HR.
TOTAL POUNDS SOLIDS FILTERED x 1000
502
828
YIELD PSF/HR.
POUNDS DRY SOLIDS FILTERED
% BY WEIGHT CHEMICALS USED
% CaO
% FeCl3
YIELD IN LBS./FT.2/HR.
% CaO USED BY DRY WEIGHT
TOTAL POUNDS OF DRY SOLIDS FILTERED
% FeCl3 USED BY DRY WEIGHT
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963
19____
19____

VACUUM FILTER OPERATION

MONTH	FILTER HOURS		% SOLIDS DIGEST SLUDGE	1000 LBS. DRY SOLIDS FILTERED	1000 LBS. LIME	% LIME	1000 LBS. $FeCl_3$	% $FeCl_3$	% SOLIDS FILTERED SLUDGE	YIELD PSF/HOUR
	#1	#2								
JAN.	71.5	-	9.65	228.3	15.60	6.83	7.68	3.35	17.9	6.39
FEB.	110.3	-	9.90	359.9	25.87	7.19	12.08	3.35	16.5	6.52
MAR.	69.0	-	9.97	232.0	15.02	6.48	8.85	3.82	15.7	6.73
APR.	91.0	-	9.65	313.0	19.39	6.20	12.28	3.93	15.3	6.88
MAY.	132.0	-	8.94	381.2	27.97	7.34	11.53	3.03	15.7	5.77
JUNE	89.0	-	9.70	280.8	19.04	6.78	6.02	2.14	16.6	6.32
JULY	87.0	-	9.20	263.4	18.30	7.00	5.41	2.00	19.0	6.04
AUG.	34.0	-	10.9	106.7	7.51	7.05	2.00	1.87	19.7	6.28
SEPT.	46.0	-	9.4	127.4	8.85	6.90	2.12	1.70	19.3	5.70
OCT.	20.5	-	7.2	41.0	4.03	9.84	0.93	2.27	N.A.	4.00
NOV.	105.0	-	6.45	178.1	20.06	11.20	4.68	2.63	14.0	3.40
DEC.	41.5	-	4.67	54.95	9.10	16.60	2.15	3.92	N.A.	2.68
TOTAL	896.8			2566.8	190.74	99.41	75.73	34.01	169.7	66.71
AVG.	74.7		8.80	213.9	15.89	8.28	6.31	2.83	16.97	5.55

COMMENTS

During the first half of 1963 the average number of hours the filter was operated per month was 97 hours. This figure dropped to 56 hours per month during the latter part of the year due to difficulties in sludge coagulation, repairs to the sludge hopper and water shortage. During the year, however, 1285 tons of dry solids were filtered which, at 17% solids represents 7558 tons of sludge which was hauled away by truck.

The solids content of the digested sludge was increased from 8.8% to 17% or conversely, the moisture content of the digested sludge was reduced from 91.2% to 83% by means of vacuum filtration. This represents about a 50% reduction in the volume of sludge to be hauled.

It should also be noted that the solids in the digested sludge dropped from 9.5% solids to 5% solids by the end of the year, which reflects the introduction of activated sludge to the digesters - a material more difficult to digest and filter than primary or raw sludge.

The ferric chloride and lime consumption lies within the normal range for primary sludge. The filter yield was acceptable for primary sludge, however, the yield dropped during November and December which again illustrates the effect of activated sludge on vacuum filtration.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	280.02		
FEBRUARY	238.50		
MARCH	244.00		
APRIL	238.00		
MAY	241.00		
JUNE	231.92		
JULY	241.00		
AUGUST	235.28		
SEPTEMBER	235.43		
OCTOBER	227.09	3860	1.69
NOVEMBER	216.47	6826	3.15
DECEMBER	212.43	9260	4.35
TOTAL	2841.14	19946	
AVERAGE	236.76	6648	3.06

COMMENTS

Chlorination facilities were constructed during 1963 and were placed in operation in October of that year. The chlorine dosage rate is based on the amount necessary to maintain a residual of 0.5 PPM after 15 minutes of contact time.

Year round chlorination will be practiced in the future.

1963

PLANT **Total Operating Costs** **MONTHLY**

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	6429.38	5062.07	-	-	1048.19	(270.00)	463.11	-	90.71	35.30	-
FEB	8882.33	5057.82	-	194.08	1051.34	1592.31	371.74	-	288.38	326.66	-
MARCH	6976.11	5043.22	-	-	1049.05	328.00	127.45	106.65	81.22	240.52	-
APRIL	9129.77	4940.71	-	92.82	1026.42	2046.80	63.66	353.59	76.43	529.34	-
MAY	10427.57	5057.82	-	-	1044.63	320.25	68.58	-	77.71	3813.67	44.91
JUNE	9172.75	4847.81	173.72	-	993.53	1548.44	391.93	257.85	708.85	250.62	-
JULY	14052.09	7347.53	743.69	-	919.92	344.19	218.27	129.86	1604.00	2744.63	-
AUG	8364.90	5166.88	559.66	-	870.77	-	668.60	3.92	77.82	1017.25	-
SEPT	20077.84	5704.61	1327.21	-	1635.08	9784.87	184.91	202.22	1069.85	94.21	74.88
OCT	11631.79	5940.74	607.45	-	2195.24	688.94	1198.51	221.46	528.48	250.97	-
NOV	14660.55	6139.86	167.80	390.37	2621.85	-	480.24	74.69	475.07	4260.67	-
DEC	17741.78	9158.97	355.98	-	2884.56	1533.87	878.38	298.88	2289.62	286.62	54.90
TOTAL	137546.86	69518.04	3935.51	677.27	17340.58	17917.67	5115.38	1649.12	7368.14	16850.46	174.69

PLANT **YEARLY**

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER CAPITA PER YEAR.	COST PER TON OF BOD REMOVED
1961	2649.60	118,269.00	50.30	1.47	87.00
1962	3254.55	100,007.00	30.72	1.25	57.50
1963	2841.14	137,547.00	49.46	1.75	56.00
	BASED ON 1963 ASSESSED POPULATION OF 80,283				

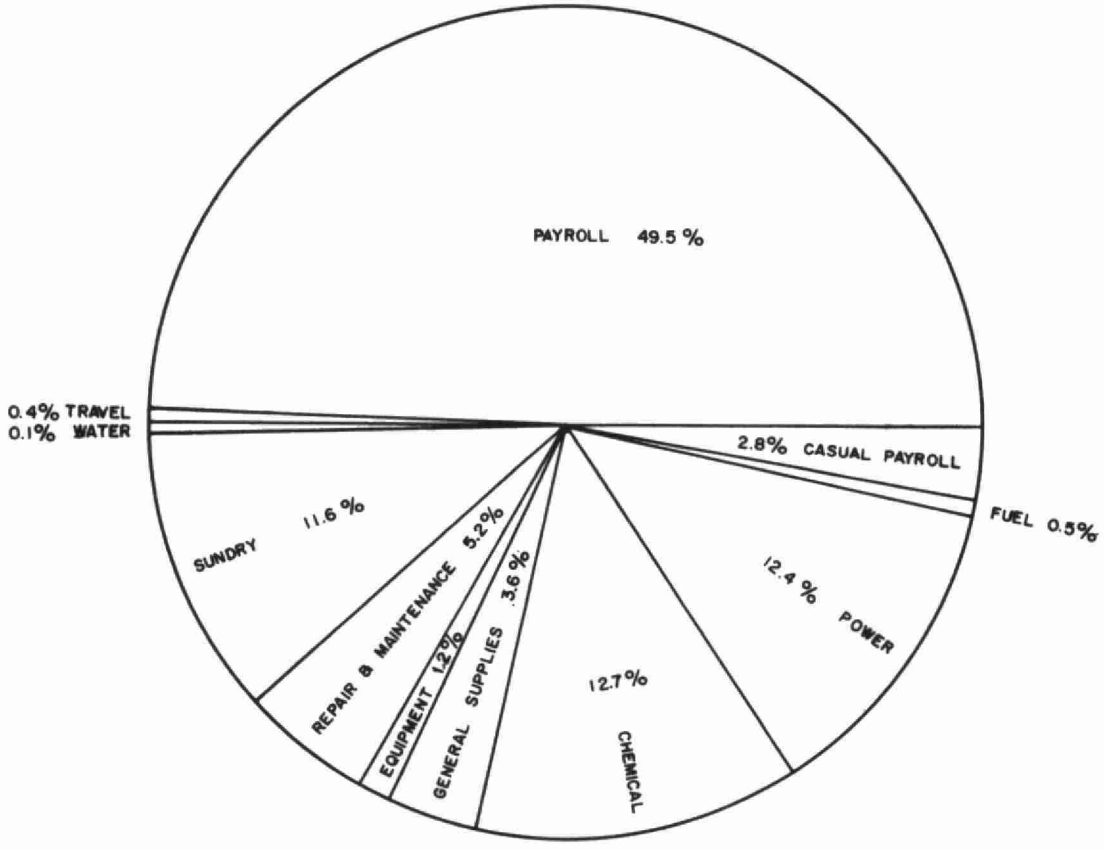
VACUUM FILTER COSTS MONTHLY

MONTH	COST PER MONTH					ACCUMU-LATIVE TOTAL	COST PER TON DRY WEIGHT					ACCUMU-LATIVE TOTAL
	$FeCl_3$	LIME	LABOUR	ELEC	MAINT		$FeCl_3$	LIME	LABOUR	ELEC	MAINT	
JANUARY	495	180	286	114	80	1155	4.34	1.58	2.51	1.00	0.70	10.13
FEBRUARY	893	297	440	180	80	1890	4.96	1.65	2.44	1.00	0.44	10.49
MARCH	655	173	276	116	80	1300	5.64	1.49	2.38	1.00	0.69	11.20
APRIL	908	212	364	157	80	1721	5.80	1.35	2.33	1.00	0.51	10.99
MAY	855	322	527	190	80	1974	4.50	1.69	2.77	1.00	0.42	10.38
JUNE	446	223	356	140	80	1245	3.18	1.59	2.54	1.00	0.57	8.88
JULY	400	210	348	132	80	1223	3.04	1.60	2.66	1.00	0.61	8.91
AUGUST	148	86	136	53	80	503	2.78	1.61	2.55	1.00	1.50	9.44
SEPTEMBER	157	102	184	64	80	587	2.46	1.60	2.90	1.00	1.26	9.22
OCTOBER	69	46	82	20	80	297	3.33	2.24	4.00	1.00	.91	14.47
NOVEMBER	347	230	420	89	80	1166	3.90	2.58	4.72	1.00	1.41	13.61
DECEMBER	159	105	166	28	80	538	5.80	3.84	6.04	1.00	2.91	19.59
TOTAL	5532	2166	3585	1283	960	13599	49.73	22.82	37.84	12.00	14.93	137.31
AVERAGE PER MONTH	461	182	299	107	80	1133	4.14	1.90	3.15	1.00	1.24	11.44

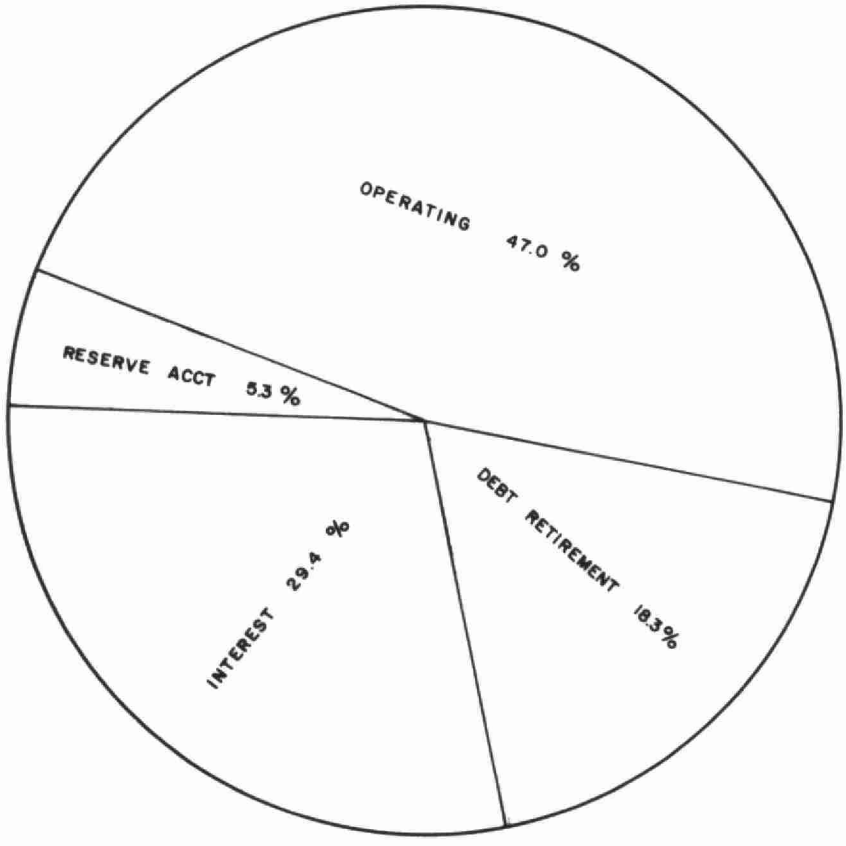
COMMENTS

Vacuum filtration operation during 1963 cost $13,599.00 or $11.44 per ton of dry solids filtered.

1963 OPERATING COSTS



TOTAL ANNUAL COSTS



SUMMARY

The report has given in detail significant data on the operation of the various treatment units at the Kitchener Sewage Treatment Plant. No operational data is presented on the activated sludge aeration section, which was placed in operation in August of 1963. In subsequent years, aeration tank results will be included in this report.

With an average daily flow of 7.78 million gallons, the plant is well below its full treatment capacity of 13.5 million gallons per day. The annual flow to the plant has decreased by 2.5% since 1961. However, the trend is expected to be upward due to the growth and development of the City of Kitchener.

During the past year, the treatment efficiency has been doubled with the construction of secondary treatment facilities in the form of a mechanically aerated activated sludge process. The effluent being discharged to the Grand River is now of a quality superior to the Commission standards of 15 PPM BOD and suspended solids.

The operating costs for the plant have continued to increase due to increased cost of labour, supplies and maintenance. The addition of secondary treatment will increase the 1964 operating costs to a figure considerably higher than the 1963 expenditures. Besides the costs of operating the additional facilities, there is a greater quantity of sludge to filter and haul due to increased solids removal. The percentage increase in treatment efficiency, however, exceeds the percentage increase in operating costs.

Under supervision by head office engineers, the plant staff has operated a clean, attractive and efficient plant for the City of Kitchener. The enlarged treatment facilities have improved these qualities making the existing plant a credit to all responsible for its construction and operation.

Total 1963 Costs

The total cost to the municipality du

Operating.....

Debt Retirement.....

Reserve.....

Interest.....

TOTAL

Note: The amount in the Reserve A
$46,778.04.

On the basis of the 1963 assessed
cost of the Kitchener Sewage Trea
per person.

Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION
801 BAY ST. TORONTO 5